REMARKS

The Amendments

Claim 1 has been amended to specify that the method is capable of lowering the BOD from about 750 ppm to under 400 ppm in 24 hours. New claim 11 has been added to specify that the BOD is lowered to about 100 ppm in six days. Support is found, e.g., at page 6, lines 24-28. No new matter has been added. A typographical error has been corrected in claim 10.

The Rejection under Section 103(a)

Claims 1 and 3-10 have been rejected under 103(a). The references cited are U.S. Patent No. 6,235,339, Harmon et al.; U.S. Patent No. 4,559,145, Roets; the "admitted prior art" (page 5, lines 6-10 of the specification, which states that aeration can be accomplished by means known to the art and that the time of aeration depends on the beginning BOD and COD levels f the effluent to be treated and the desired final levels, which can be determined without undue experimentation; U.S. Patent No. 4,983,297, Kaczmarek et al.; and U.S. Patent No. 4,085,041, Othmer. The Office Action states:

> Harmon et al. teach that using magnesium chloride instead of the prior art usage of iron chloride is beneficial. (See col. 4, lines 28-41). Harmon et al. teach treating organic waste streams containing animal fat, blood, tissue, etc. The amount of magnesium chloride: 0.5-5.0% by vol. The patent does not teach aeration. It does teach the magnesium chloride-dissolved air flotation process and the removal of the flocculated material. See col. 3, lines 60-67. The patent also teaches reducing the BOD to less than about 750 ppm. See claim 5.
>
> Roets teaches chemically treating proteinaceous waste, and then aeration of the waste water. Foam formed is removed during the aeration. See the claims that describe the steps. In this regard, Fullerton et al. teach at col. 2, lines 1-10, that oxygen aeration produces foam that is typically undesirable, which rises to the top and is removed.

The specification discloses that the aeration is performed as is known in the art. The prior art listed therein is said to accomplish the aeration. Othmer teaches coagulating and flocculating waste first before aeration, and then using a Venturi system for the aeration (col. 2, line 4, col. 4, lines 48-50) to reduce BOD (line 56). As for the time used for aeration, lines 15-25 (col. 4) teaches some of the parameters determining this. However, aeration time will depend on the degree of reduction of BOD required in the effluent. See also col. 10, lines 42-44. Kaczmarek et al. is used here only to show that aerobic waste treatment also is used because the method decreases BOD. See col. 4, lines 46-49.

It would have been obvious to combine the chemical treatment of proteinaceous wastes of Harmon et al. with an aeration step as shown by Roets, which is also drawn to the same endeavor and uses iron chloride instead of magnesium chloride, which is followed thereafter by aeration. Since Kaczmarek et al. teach that aeration also reduces BOD in waste treatment, then such disclosure provides the motivation to combine Harmon et al.'s magnesium chloride treatment to reduce BOD with aeration to reduce BOD, in the same manner as Roets, i.e. chemical treatment followed by aeration. It would also have been obvious to remove any foam formation for the reasons shown by Fullerton et al. and Roets. To use any aeration system, including the Venturi system as shown by Othmer would have been obvious, since no unobviousness in his regard has been established herein.

The Office Action continues, rebutting Applicants' previous arguments:

Applicant has argued that aerating the waste stream for a time of about one to seven days provides a BOD level that is reduced more when $MgCl_2$ is used. A review of the references applied show the following:

- Roets teaches clarifying proteinaceous waste water with chemical ($FeCL_3$) and aeration.
- Harmon et al. teaches the benefits of using $MgCl_2$ instead of $FeCl_3$ and the benefits of substituting one for the other in the reduction of BOD.
- Therefore, to replace $FeCl_3$ with $MgCl_2$ would have been prima facie obvious in Roets.
- Kaczmarek et al. is drawn to waste water treating with aeration and teaches reduction of BOD with this method. One embodiment shows aeration for a day.
- Othmer teaches an aeration time from 30 minutes to several hours.
- Othmer teaches that the aeration time depends on whether coagulating and deflocculating agents were used.

- The specification discloses that "The time of aeration depends on the beginning BOD and COD levels of the effluent to be treated and the desired final levels. This can be determined without undue
- Thus aeration time depends on the nature of the BOD, the BOD levels in the effluent to start with and the final levels desired, and whether coagulating and deflocculating agents were used. And all of these factors can be used to determine aeration time, *without undue experimentation.* [Emphasis in original.]

- Therefore, when Harmon et al. is combined with references that teach chemical treatment with iron chloride and aeration, and the iron chloride is substituted with magnesium chloride, and the aeration time calculated based on all the factors above, *without undue experimentation*, then the aeration time would be obvious. Also, it is well settled that a patent cannot be properly granted for [an invention] which would flow naturally from the teaching of the prior art. *American Infra-Red Radiant Co. v. Lambert Indus., Inc.,* 360 F.2d 977, 986 [149 USPQ 722 (CCPA 1958)] (8th Cir.) (quoting *Application of Libby,* 255 F.2d 412 [118 USPQ 194 (CCPA 1958)] CERT. DENIED, 385 U.S. 920 [151 USPQ 757] (1966). [Emphasis in original.]

  As for applicant's characterization of Kaczmarek et al. being drawn to water effluents from crude oil production wells, the treatment is still related to waste water effluents and is relevant prior art and moreover, the claim includes waste water from chemical plants, which this is. Applicant states that the reference aeration includes microorganisms, but waste water from fermentation plants, which the claim includes, would also include microbes. When one skilled in the art is looking to clarify waste water effluents, all prior art that relates to decreasing BOD is analogous art. In fact patentees state at col. 4, lines 47-49: "Any conventional aerobic waste water treatment method for decreasing the Biological Oxygen Demand (B.O.D.) level may be used."

Independent claim 1 has been amended to specify that the method is capable of achieving a BOD reduction from about 750 ppm to under 400 ppm in 24 hours. As described at page 6, third full paragraph, this is an unexpected improvement over similar methods in which $FeCl_3$ is used instead of $MgCl_2$. Such an improvement would not be obvious to one skilled in the art. One skilled in the art would not be able to design an efficient waste water treatment system using $MgCl_2$ instead of $FeCl_3$ with aeration having only the teachings of the prior art before him/her. One would need to know the additional discovery disclosed in the present invention, namely that $MgCl_2$ is much more efficient than $FeCl_3$ in

reducing BOD. See Figures 1A and 1B hereof, and the third full paragraph of page 6.

Despite the fact that applicants stated that aeration time can be determined by one skilled in the art without undue experimentation, this is only true in light of applicants' new teachings in the specification that $MgCl_2$ is much more efficient than $FeCl_3$ in reducing BOD. This statement cannot be taken out of context and interpreted as though it said: "The time of aeration depends on the beginning BOD and COD levels of the effluent to be treated and the desired final levels. This can be determined based only on prior art teachings and not on the new teachings herein without undue experimentation."

Only when one skilled in the art has the critical piece of information that $MgCl_2$ is much more efficient than $FeCl_3$ in reducing BOD can he/she design a waste water treatment method using $MgCl_2$ that is efficient to achieve the BOD reductions claimed herein within the time frames claimed herein.

None of the references disclose or suggest a treatment time as long as one day as presently claimed herein, much less as long as seven days.

Harmon et al. does not teach aeration at all, and teaches that after flocculation the supernatant liquid typically contains "about 800 ppm BOD or less" (col. 3, last paragraph and col. 4, first paragraph). To get the BOD and COD levels lower, sodium hypochlorite or hydrogen peroxide have to be used (col. 4, second paragraph). Note that claim 10 hereof specifies that sodium hypochlorite and hydrogen peroxide are not added to the waste stream.

Roets also does not specify an aeration time, nor BODs as high as those dealt with herein. Nor does it provide any guidance regarding how much time would be required to achieve BOD reductions as claimed herein.

Fullerton et al. does not teach the use of any flocculant. It teaches an aeration time of about 7-1/2 hours (Example 4), and less time in the other examples.

Othmer, at col. 10, lines 42-44, teaches an aeration time between 30 minutes to several hours, and in claim 8, from 10 minutes to five hours, depending on whether coagulating and deflocculating agents have been used. In any event, even if Othmer taught that aeration time depends on the degree of reduction of BOD required in the effluent, such a teaching would need to be interpreted to be within the limits of the times disclosed in Othmer, *i.e.,* 10 minutes to five hours.

Although Kaczmarek in Table III specifies a retention time of one day in the aerobic treatment zone, it does not teach a longer retention time. Kaczmarek is a completely different process than that claimed herein because it uses an anaerobic biological treatment and then an aerobic biological treatment in which microorganisms are added to the material. See, *e.g.,* claim 1. This reference has been cited "only to show that aerobic waste treatment also is used because the method decreases BOD. See col. 4, lines 46-49." (Office Action, page 3, first full paragraph.) The language in the reference reads as follows:

> The waste water stream **26** is introduced into aerobic treatment zone **4**. Any conventional aerobic waste water treatment method for decreasing the Biological Oxygen Demand (B.O.D.) level may be used. The waste water stream **26**, after appropriate pH adjustment, is contacted with a biomass of aerobic microorganisms in the presence of a molecular oxygen-containing gas, which may be air or other oxygen-containing gas. Aeration or oxygenation may be carried out by any known method." (col. 4, lines 46-54.)

It is clear from this language that when the patent refers to "aerobic waste water treatment," it refers to processes using *added* aerobic microorganisms, not to processes using simple aeration. Even if, as the Office Action points out, fermentation plant effluents might contain microbes, this does not make the Kaczmarek et al. process using added aerobic microbes relevant to the present process which uses simple aeration. An "aerobic" treatment time as disclosed in Kaczmarek et al. of one day is not equivalent to an aeration treatment time as claimed herein of one day.

Because no reference, and no combination of references, teaches or suggests an *aeration* time as long as one day, to achieve BOD reductions as claimed herein, it is submitted the claims are not obvious in view of the references.

In addition, Roets does not disclose the use of ionic magnesium as is claimed herein. It discloses also that a pH below 7 should be used (col. 1, line 64), and a pH of less than about 6.5 is desirable (col. 2, lines 65-66). One skilled in the art would be unlikely to combine the teachings of Roets with those of Harmon et al. because the Harmon et al. requires a pH of at least about 7.0 (col. 1, line 62). As there is no motivation to combine these references, no *prima facie* case of obviousness has been made out.

Note that Harmon et al. teach against new claim 10 which specifies that no sodium hypochlorite or hydrogen peroxide oxidizing agents are added to the waste stream. Harmon et al. teaches that it may be necessary to add such oxidizing agents (col. 4, lines 8-22), whereas the present invention teaches that aeration eliminates the need for oxidizing agents such as sodium hypochlorite or hydrogen peroxide (p. 3, lines 24-25). Roets also teaches adding oxidizing agents (paragraph bridging cols. 2 and 3).

It is submitted that the present claims are allowable over the cited references. An aeration period of as long as one day to one week is not taught or suggested by the relevant references. In fact, these references teach against such a long period in disclosing times of two hours (Fullerton) or up to five hours (Othmer). It is well-settled that a reference that teaches against a particular claimed element cannot be combined with that element in order to formulate an obviousness rejection. (See, *e.g., Mitsubishi Elec. Corp. v. Ampex Corp.* 190 F.3d 1300, 51 U.S.P.Q.2d 1910 (CAFC 1999).) Moreover, there is no motivation to combine the references as discussed above. Thus no *prima facie* case of obviousness has been made out with respect to the currently-presented claims.

Conclusion

This application appearing to be in condition for allowance, withdrawal of the rejections and passage of this application to issuance is respectfully requested. This response is accompanied by a Request for Extension of time of one month and a Request for Continued Examination. Please deduct any fees due amount and any amount required for any further extension of time necessary from deposit account 07-1969.

Respectfully Submitted,

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